Synthesis and analysis of 13 CSREES CEAP projects

USDA-CSREES-CEAP
Conservation Effects Assessment Project

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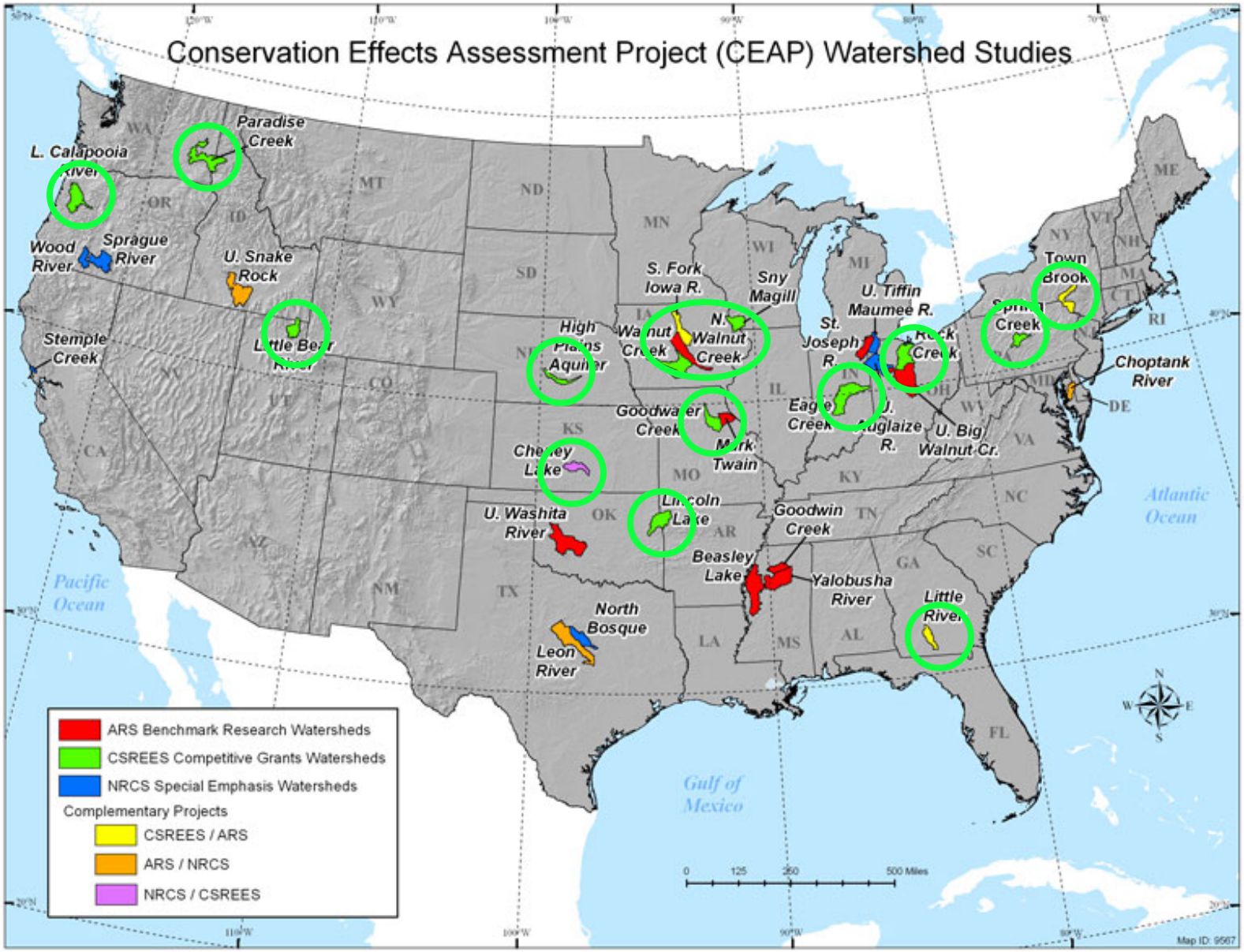

Conservation Effects Assessment Project (CEAP) Watershed Studies
Paradise Creek
L. Calapooia River
Wood River
Sprague River
U. Snake Rock
Little Bear River
Stemple Creek
High Plains Aquifer
Walnut Creek
S. Fork Iowa R.
Sny Magill
U. Tiffin Maumee R.
St. Joseph R.
Rock Creek
Town Brook
Spring Creek
Choptank River
Eagle Creek
U. Auglaize R.
U. Big Walnut Cr.
Goodwater Creek
Mark Twain
Cheney Lake
Lincoln Lake
U. Washita River
Goodwin Creek
Beasley Lake
Yalobusha River
Little River
North Bosque
Leon River
Pacific Ocean
Atlantic Ocean
Gulf of Mexico
ARS Benchmark Research Watersheds
CSREES Competitive Grants Watersheds
NRCS Special Emphasis Watersheds
Complementary Projects
CSREES / ARS
ARS / NRCS
NRCS / CSREES
0 125 250 500 Miles
Map ID: 9667

Setting the synthesis stage

- Conservation practices (or BMPs) occur in many different settings (e.g. hydrology, soils, climates, topography, farming practices, cropping systems)
- Desire optimal placement of a system of practices to achieve water quality goals while maintaining economic viability and recognizing socially enabling conditions/constraints

Setting the synthesis stage

- CEAP synthesis is more than13 individual CEAP projects. It delivers a comprehensive approach to watershed-scale assessment and characterization of BMP systems
- Opportunity to build understanding of fundamental processes in hydrology, contaminant transport, stream dynamics, behaviors/ attitudes to social acceptability, and economics to assess effectiveness of BMP systems in CEAP watersheds.

Team expertise

- Hillslope to Watershed scale modeling for source-to-outlet pathway analysis
  - New variable source area models (VSLF, SWAT & WEPP)
  - Stream transport modeling (sediment)
- Spatial optimization of BMP systems
- Socio-economic analysis and assessment
- Outreach

VSLF Variable Source Loading Function

Objective 1

- Develop a web-based data information system

Objective 2

- Analyze BMP effectiveness of individual and systems of BMPs

Objective 3

- Analyze social and economic factors that facilitate or impede implementation or maintenance of BMPs

Objective 4

- Synthesize the findings and develop systems of BMPs for agricultural landscapes

Objective 5

- Develop a synoptic approach for geographic prioritization of BMP implementation at multiple scales

Objective 6

- Translate findings into science-based knowledge that informs policy decisions to enhance effectiveness of conservation programs and practices through improved design and implementation

Objective 7

- Conduct targeted outreach activities with key stakeholder groups for improving management of agricultural landscapes

Three phases

Phase 1
Analysis and synthesis of findings from the 13 CEAP projects

Phase 2
Synthesis of science-based knowledge for conservation policy decisions

Phase 3
Outreach of findings to key stakeholders

Phase 1

- Inventory (watershed descriptions, water quality constituents of concern, water quality goals, monitoring periods/design/frequencies/locations, models, and statistical analyses)
- Characterization (hydrologic and geomorphic setting: climate patterns, dominant hydrologic processes, water body classification, ecoregion classification)
- Data gathering (water quality time series, spatial data, cost-share programs, land-ownership vs lease, social indicators)
- Analysis (classification of BMPs, effectiveness)

Phase 2

- Integration of physical, economic and social aspects of BMP effectiveness for watersheds
- “Lessons learned” in the broadest sense
- Framework for assessment for other watersheds in the nation in similar ecoregions as CEAP watersheds
- Ecoregion classification
- Water quality modeling
- Geographic prioritization (synoptic approach)

Synoptic Approach

- The synoptic approach is an ecologically-based tool for geographic prioritization.
- Specifically designed to incorporate best professional judgement in cases where information and resources are limited.

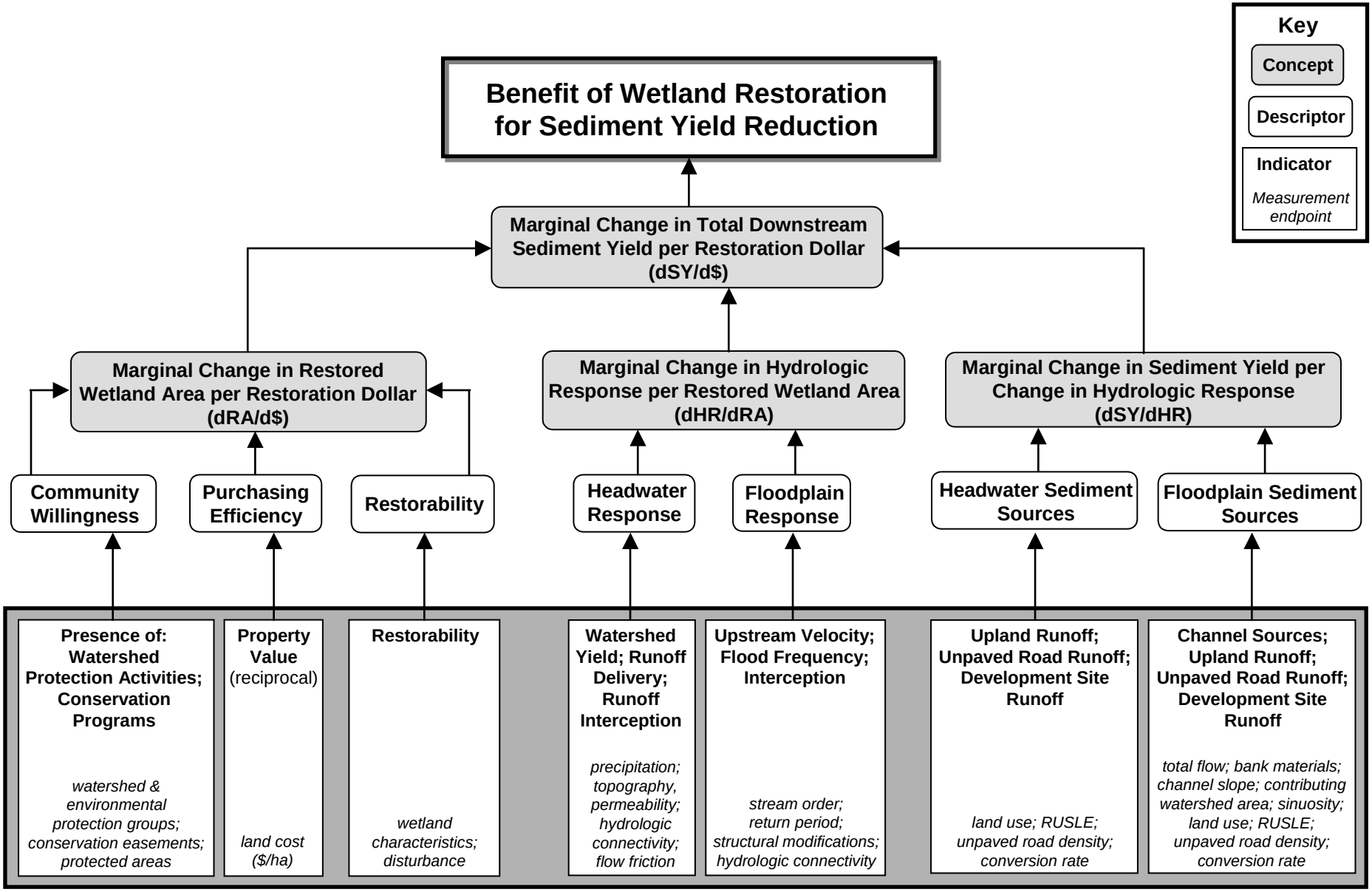
Leibowitz et al. (1992)

Synoptic Assessment

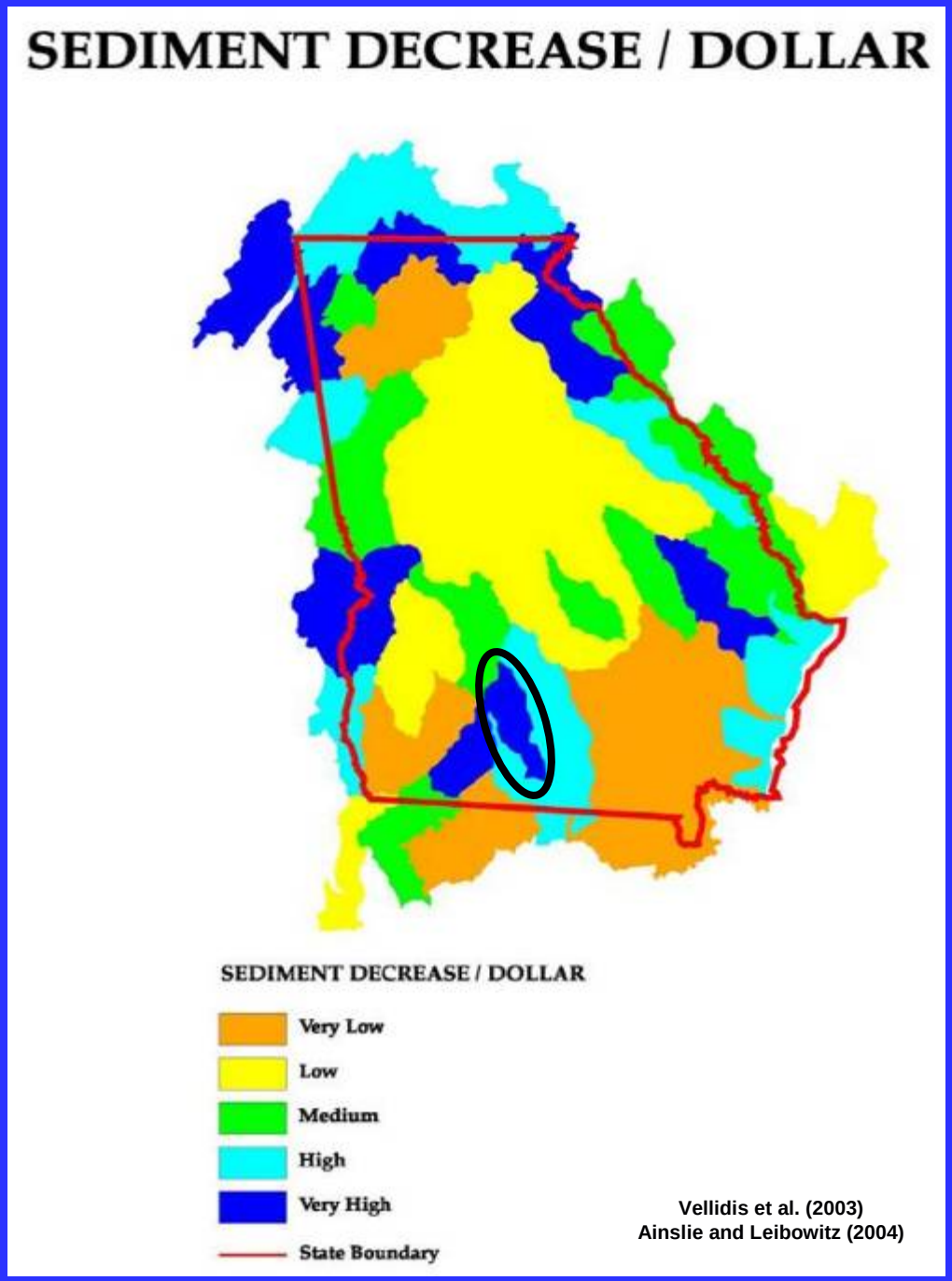
- Synoptic assessments use a benefit-cost framework to calculate indices for functional criteria in subunits (watersheds, counties, etc.) of a region and then rank the subunits.
- Formulation of the indices and selection of indicators used for their estimation are based on a conceptual model that incorporates the relevant ecological processes.
- Ranks can be visualized in region-scale maps which enable managers to identify areas where efforts optimize functional performance on a regional scale.

Abbruzzese and Leibowitz (1997)

Wetland Restoration for Sediment Yield Reduction: A Conceptual Model



Vellidis et al., (2003)



GIS Visualization of Prioritization Results for Georgia

- Maximum sediment reduction for dollar invested in wetland restoration
  - blue watersheds

Geographic Prioritization Objective

- Apply synoptic approach for geographic prioritization of BMP implementation at multiple scales
  - ecoregion, river basin, and watershed
- Develop prioritization criteria for three of the most common nonpoint source pollutants
  - sediment, nitrogen, and phosphorus

Geographic Prioritization Objective

- Construct conceptual models around each of the three pollutants.
- Visualize results in maps which will enable managers to identify areas where BMP implementation would optimize water quality improvement.

Phase 3

- Outreach, working with CEAP Steering Committee and stakeholders to determine best strategy for translation of lessons learned into action and policy
- Policy makers in sub-agencies under USDA
- Grower/commodity groups
- Individual growers
- Workshops on prioritization tool to NRCS staff and CEAP Steering Committee

Final outcomes

- Characterization of CEAP watersheds
- Assessment and analysis of available data on physical and socio-economic aspects of conservation practices
- Synthesis of findings for water quality assessment and management
- Priority recommendations to fill remaining information gaps
- CEAP resources for watershed assessment